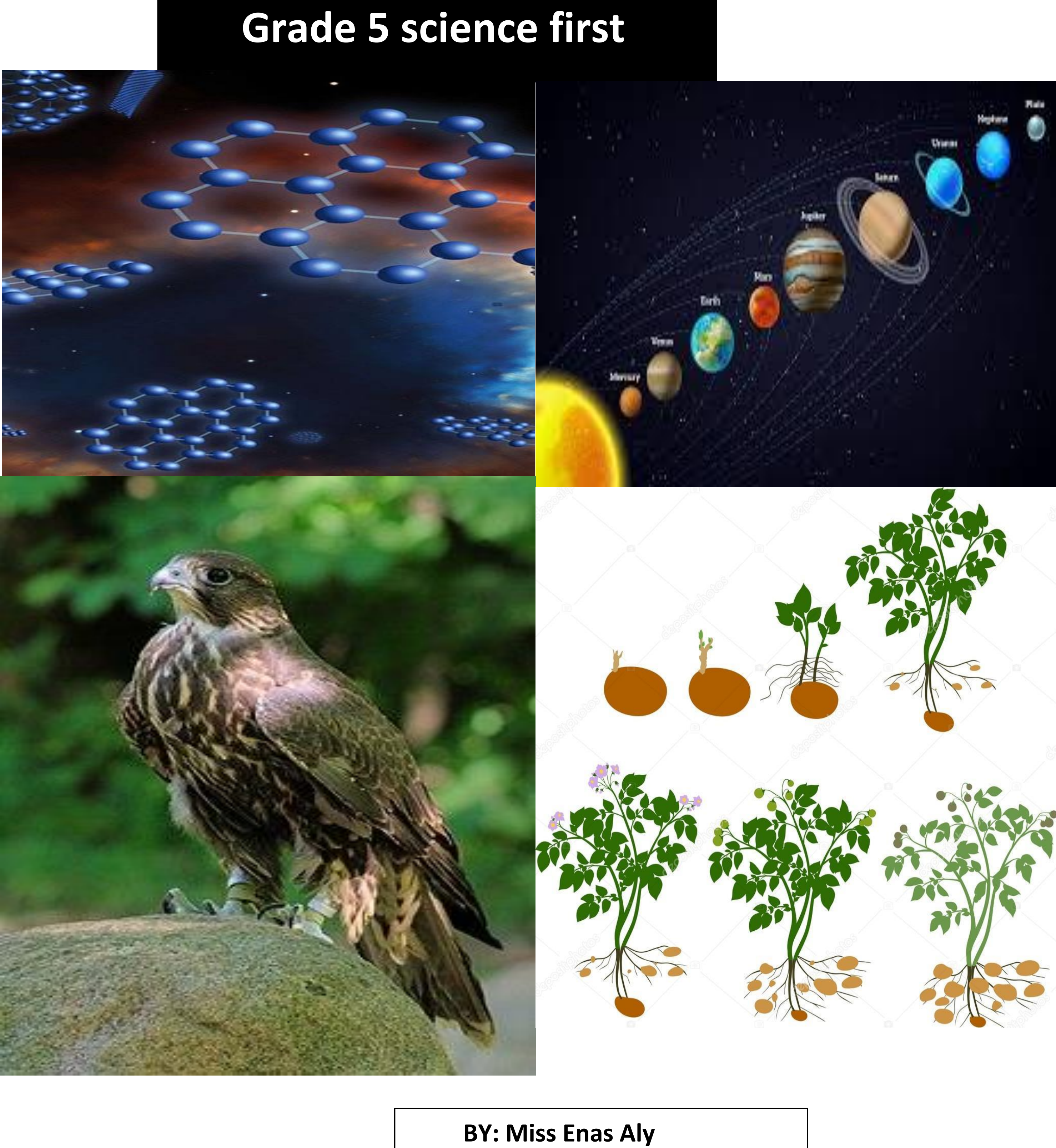
Grade 5 science first



BY: Miss Enas Aly
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Concept 1.1 plant needs

Lesson (1)

- Human, plant, animal are living organisms.

1 – Plant needs

Basic need	Not basic need
- water - air (carbon dioxide) - sunlight - soil (nutrients)	- Soil - Sugar - Oxygen gas

The plant parts

Root

- Fixing the plant in the soil.
- Absorbs water and mineral salts from the soil.

The Stem

- Transports the water and mineral salts from the roots to all parts of the plant.
- Support the plant.

The Leaves

-Absorb sunlight and carbon dioxide gas.

The Flower

- The reproductive organ of the plant to produce new plant
- Store the food (starch- sugar – protein – fats).

Human needs &plant needs

Human needs	Plant needs
- water - Air (oxygen) - the sun light - the shelter - The human gets food from animals and plants	- water - Air (carbon dioxide) - The sunlight - The soil (nutrients) - it can make its own food by itself from (photosynthesis process)

3 - Plant and food

*Plant makes its own food , Its food is a type of sugar that provides the plant with energy to grow . Plants make their food (sugar) in their leaves by "**photosynthesis**" process.*

The roots : absorb water and nutrients from the soil.

the stem: transports nutrients and water from the roots to all parts of the plant.

Photosynthesis process : It is the process in which plants use the energy in sunlight to make their own food.

Lesson 2 : Do plants need soil ?

Germination : means that the plant sprouts and begins to grow from a seed .

Hydroponic system : is the system that full of water and minerals to help the plant grow

Experiment (1) how plant grow in the light and in the dark

Tools	Steps	Observation
• Plastic cup contains potting soil • Paper towels • 6 beans seeds	• wet the paper towel with water • Place three seeds in the top half of the paper towel and fold the bottom half of the	• The growth of the seeds placed in the paper towel is similar to that of the seeds

• Plastic plate • Water • Metric ruler **Conclusions** • The seeds can grow without soil if they water and sun. • Plants can grow without soil for a while, but finally they need soil.	towel up so that it covers the seeds then, place the paper to towel Inside the plastic plate. • Plant the other three seeds in the cup that contains potting soil then, water the seeds. • Place the plate and the cup in a place where they can get sunlight. • Check the growth of seeds over the next several days. Wet the paper towel and water the soil as needed. • Measure the growth of each seed using the metric ruler.	planted in the soil • The seeds grown without soil would not grow as quickly as the seeds in the soil. 

Lesson 3 , 4 : sunlight a basic need

Photosynthesis process : It is the process through which plants use the energy in sunlight to make their own food.

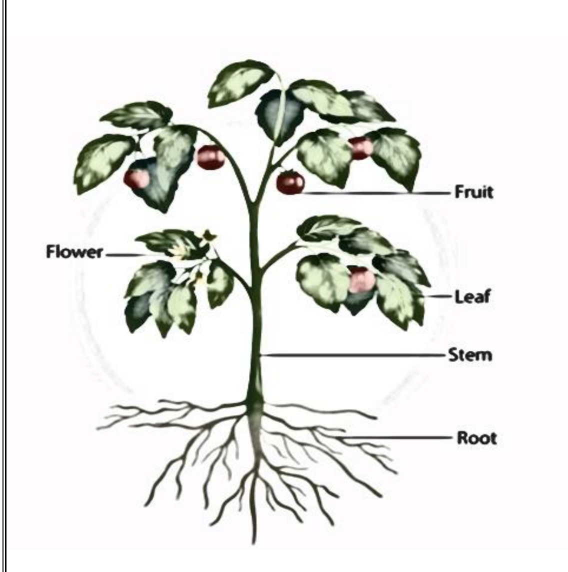
Plant need	Plant produce
• Water and nutrients (soil) • Carbon dioxide gas (air) • Sunlight (sun)	• Oxygen gas • Sugar , fats , protein

Plant structure (parts)

1- Roots:

- They absorb water and nutrients from the soil and transport it to the Other parts of the plant.
- They fix the plant in the soil.

Roots contain **roots hairs**: to get more water and Nutrients and transport them from the soil to the root.



2- Stem:

- transport water and nutrients from the root to the stem and leaves through tubes called **xylem**.
- They supports leaves and flowers of the plant.

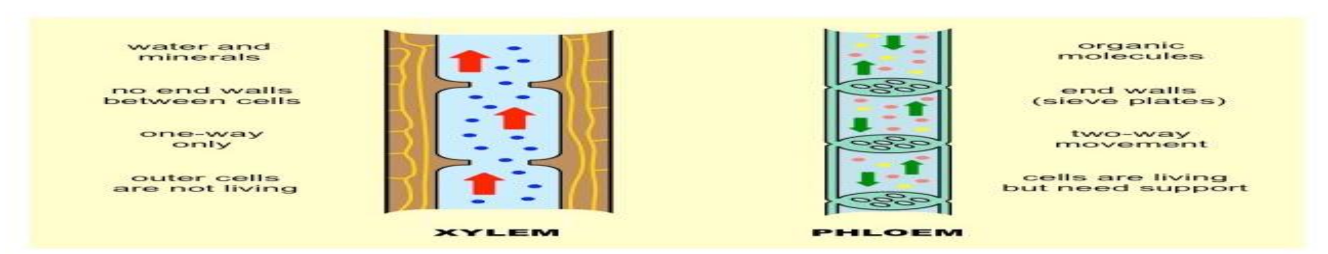
3- Leaves:

- They make food for the plant by photosynthesis process.
- They contain **chlorophyll** which gives them their green color.
- They collect sunlight and get energy from it.

The air enters the leaves through the stomata**.**

Stomata : They are tiny openings that allow air to move into the leaves.

Xylem	phloem
Transfer water and nutrient from roots to other plant's part.	Transport food from leaves to the other parts of the plant.



Kinds of stems	Kinds of leaves
• Wood stem such as tree trunks and shrubs. • Climb stem such as vines (grapes). • Upright stems such as most of flower. • Tubers that stem extend underground such as potato plant. • Runners that stem extend above and along the ground such as strawberry	• Narrow leaves: that look like needles, such as pine trees. • Flat, wide leaves.

Lesson 5 : compare plant and human systems

Circulatory system:

It is the system that transports blood and other fluids throughout the body.

Arteries

Carry blood that is rich with oxygen and nutrients (glucose) from the heart to the body cells , so that the body can grow.

Veins

Return the blood that carries carbon dioxide and is low in nutrients and oxygen back to the heart, then to the lungs where the blood carries oxygen again.

Glucose: it is the plant sugar that is produced during photosynthesis process and provide energy for the plant to survive and grow

Plants	Humans
- The transport system in plant is a system of tubes (xylem and phloem) that transport different materials around the plant Parts. - Xylem tubes carry water and nutrients from the Roots to the leaves. - Phloem tubes carry sugars from the leaves to all plant Parts.	- The transport system in human is the circulatory system that moves blood around the human body. - Arteries carry blood rich with oxygen and nutrients (glucose) from the heart to all body parts. - Veins carry blood that contains carbon dioxide and is low in nutrients and oxygen from all body parts back to the heart.

Plant food

- Plant need light energy of the sun is Transformed into chemical energy that is found in glucose. During photosynthesis process, the plant also produces oxygen And water which are released into the air.

plant reproduction :

it is the process of making new plants

- Flowers are the reproductive parts of many plants. they produce seeds for the plant that help the plant to reproduce . When seeds receive air, water and the correct temperature, they can grow into a new plant.

Lesson 6 : seed dispersal

Seed dispersal : It is a process that seeds are transported from one place to another.

Ways of seed dispersal in nature:

- Floating on water or rivers or lakes (coconut seed)
- Traveling by wind (maple seed , dandelion seed)
- Sticking to animal's fur or human clothes (burdock seeds)
- Being eaten by animals and comes out with their stool (tomato , apple seeds)

Concept 1.2 : Energy flow in ecosystems

Lesson 1

Ecosystem : It is an area (or community) that includes living organisms and non- living things that interact with each other(an ocean, a rainforest, a desert or a sea) . The interaction that present in an ecosystem occurs between animals and plants only and not between all the components.

How hawks get energy

- Hawks get energy from food.
- Hawks eat different types of animals such as, snakes, mice, fish, birds, squirrels, rabbits and other small ground animals.



- Hawks do not eat plants, but they eat animals who eat plants, so they also depend on plants for energy.

A healthy ecosystem is a community that provides food, water and shelter to all living organisms that live in it.

Energy Flow in Ecosystems

A good (healthy) ecosystem is a community that provides food, water and shelter to all living organisms that live in it.

- There is a relationship between sunlight and energy that we get from the food.
- Sun is the main source of energy in all ecosystem.

- Animals need energy that comes from eating plants and other animals, as they cannot produce their own food.

Food is energy

Human gets energy during the day from food and oxygen

Plants	Animals
- Plants can make their own food through photosynthesis process As. - sunlight converts carbon dioxide and water into glucose inside the plant leaves. - radiant energy from the sun Converted into chemical energy	- Animals and humans cannot make their own food - They get energy from the Environment in which they live. Different animals can get their Food by: Eating plants only. Eating other animals that eat plants. Eating both plants and animals.

Lesson 2 : food chain

* Living organisms are classified into three groups according to their way of feeding, which are:

(1) **Producers**: They are a group of living organisms that can make their own food .

(2) **Consumers** : They are organisms that eat other living organisms to get their energy, because they cannot make their own food.

(3) **Decomposers** : They are organisms that carry out the process of decomposition by breaking down or decaying dead organisms.(fungi, bacteria, worms and millipedes)

Primary Consumers	Secondary consumers	Tertiary consumers
They are animals that eat plants. Many insects are primary consumers.	They are animals that eat the primary consumers. Birds are secondary	They are animals that eat the secondary consumers .Tertiary consumers

	consumers, because they eat insects and other organisms that eat plants.	are often large meat eating animal

Food chain : It is a model that shows one linear set of feeding relationships and energy flow between living organisms.

- The first link in the food chain is plant (producer).

Because it uses the energy from the Sun to produce its own food.

- The second link in the food chain is locust (primary consumer).

Because it eats plant,

- The mouse is considered as a (secondary consumer).

Because it eats locust.

The frog is considered as a (secondary consumer). Because it eats mouse

- Then the eagle is considered as a tertiary consumer. Because it eats snake.
- In the final the eagle dies, it decomposes by

Decomposers and its energy is returned to the soil which makes the food chain continuity.

Predator	prey
- Is any consumer that hunts and eats another animal . - The hawk and snake are "Predators", because they hunt other animals.	- Is any animal that is hunted and eaten by another animal. - Is any consumer that hunts and eats another animal .

Lesson 3 , 4 : food web

Food web:

- It is a model that shows many different feeding relationships among living organisms
- The ways in which many food chains interact within an ecosystem form a food web.

Design a food web

Tools	Steps	Observation
Living organism's cards. Plant Mouse Snake , Rabbit , rat **Conclusion** Food web is a model that describes energy flow and feeding interactions between living organisms in an ecosystem.	1- Classify the animals in the pictures above according to the type of food that each animal eats. 2- Draw a food web using arrows to show the suitable food for each animal.	- The mouse and rabbit eat the green plant. The snake eats the mouse .The eagle eats the mouse, rabbit and snake. - Draw a food web using arrows to show the suitable food for each animal.

Lesson 5,6 : decomposers

Decomposers are organisms which make one of the most important processes on the Earth which is called decomposition process

First	Second
When animals and plants die, there are animals called (scavengers)eat these dead organisms and break them down into smaller	Decomposers complete the process of decomposition by breaking down the smaller pieces of remains of dead plants and animals into nutrients that can

pieces. (vultures , hyenas , carbs , cockroaches , house flies)	be returned to the ecosystem so, Plants can use these nutrients to make their own food. (snails , slugs , earthworms , fungi , bacteria)

Scavengers: they are organisms that feed on the remains of dead animals and plants

Waste and dead organisms

Waste	Dead organisms
There are only one way that people use to reduce these waste materials and trash Known as "Recycling". In recycling process people use the waste materials and make new products instead of going into a landfill.	When organisms die, decomposers undergo decomposition process to release nutrients back into the environment so, they can be used again. Remains of animals and plants are decomposed and become part of the soil, which is used by plants to make their own food.

Ecologist: They are the scientists who work on restoration projects to Have a stable environment for plants to survive.

Restoration ecology: means rebuilding habitats that are damaged.

- It helps animals to increase their number.
- Restoration ecology positively affects human health.

Concept 1.3 : changes in food webs

Lesson 1

The factors that affected the ecosystems and food webs :

- pollution
- climate changes
- human activities

Pollution: it is the harms happen to air, water and soil due to human activities that can harm living organisms .

the food web changes

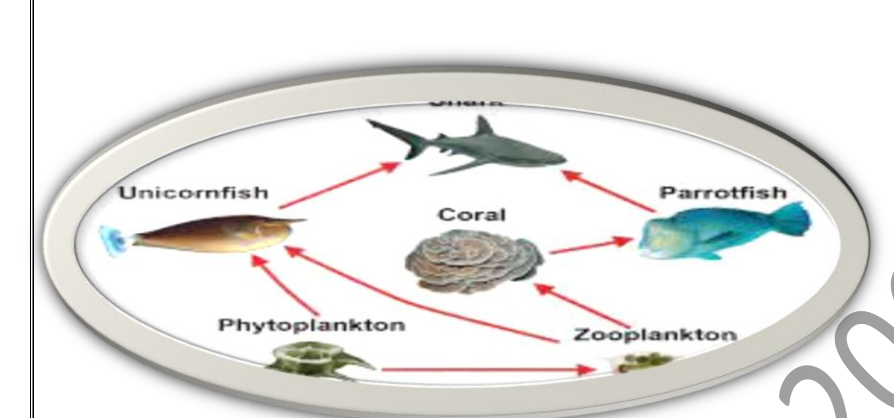
- The disappearance of producer: make consumers migrate to search For food.

- The presence of a large number of one type of organism: make their Food disappear.

Protect the ecosystem

Protection the marine environment in Palau Island: Control the human activities on land by:

- Avoid water pollution (when throwing waste materials in ocean.
- Prevent overfishing (catching many fish from rivers, seas and ocean.
- if an ecosystem changes the food webs will change.



How does eco system affect food web

The harm	Result	Reason
If there is a gentle rain in the desert ecosystem	the desert ecosystem may be improved	Because rainwater will feed the plants which will feed the organisms .
There is a heavy rain in the desert	the desert ecosystem may be harmed.	Because the water of heavy rain will cause flooding that will destroy the ecosystem .
there is a drought and all the grass dies	The food web in the ecosystem may be destroyed.	Because the plants will die and also the organisms will die.
there are many top predators in the food web	the other organisms in the food web like lions, tigers and sharks may be	because the top predators will eat all the organisms.

	harmed.	

Lesson 2 : Energy flow

The food web in the desert :

Energy can't be created or destroyed but it transfers.

Decomposer : gets energy from decomposing the bodies of

The sun is the main source of energy.



Producer: green plants

Secondary consumer: nergy transferred to the condary consumer when it feeds on primary



Primary consumer: energy transferred to

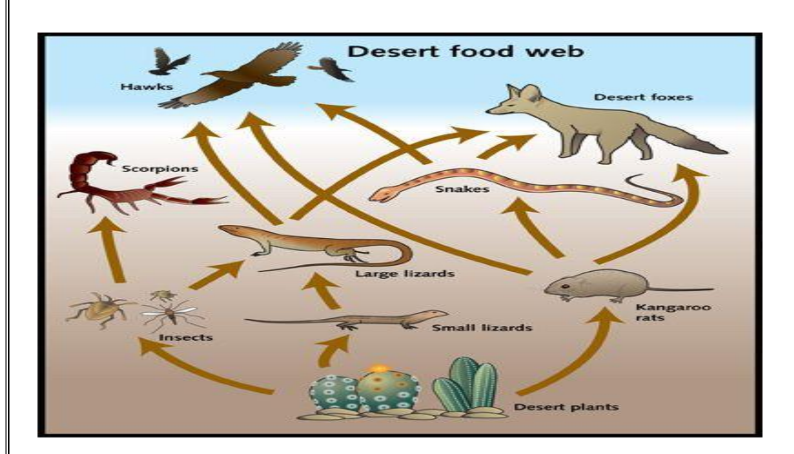


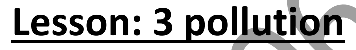
The first source of energy is the sun, then energy transfers to plants (producer), then transfers to (consumers) that when they die the (decomposers) convert them into simple substances and return the energy back to the soil.

The sun transfers energy to producers until it reaches the decomposers

The energy in the overall system remains as the same ,where :

- 10 % only of this energy transfers between living organisms when an organism feeds on the other.
- 90 % of this energy is left to decomposers which return this energy back to the soil.





Lesson: 3 pollution

Pollution effect on food webs:

- Forest fire produces smoke and ash that are spread all over the forest and cover the grasses, causes difficulty breathing of animals.
- Pollutants produced from forest fire harm air, grasses, animals, respiratory system.
- Leakage of oil into seawater negatively affects the marine Organisms.

Factors affect the population:

- increasing or decreasing the amount of water.
- increasing or decreasing the temperature.
- Climate change.

Population changes

Population: it is the number of organisms of one type of species living in an area . all species depend on other species for survival, so an increase or decrease in one species affect the population causing population change.

Sea birds	Microorganisms
- Seabirds build their nests on the top of mountain cliffs. - Seabirds feed on small fish, the small fish feed on Microorganisms that float on the surface of the sea.	- They are too small organisms that can't be seen by eyes. - They are producers in the marine food web. - They make their own food and live in cold water habitats.

If water temperature increase, microorganisms will move search for colder water then small fish search for microorganisms that lead to death of sea birds.

Lesson 4 : habitat loss

Healthy habitats are important to all organisms in food web because they provide organisms with resources that they need to survive. When these habitats are destroyed, different organisms may not be able to survive.

Example of habitat loss in a coral reef system :

Coral reef	Coral bleaching
Some of the most diverse and valuable ecosystem on earth. - they provide food and shelter for large numbers of fish and other marine organisms . - They are important for tourism.	When water is very warm, coral reef will get rid of the algae living in their tissues it make coral reefs turn completely into white.

The result of coral bleaching:

- Fish and other marine that depend on coral reef for food and shelter may die.
-People that depend on coral reefs and for food will be negatively affected.

- Human activities can affect the ecosystem by :

- Building up more buildings.
- Throwing waste materials in water.
- Overfishing in seas and oceans.

Plastic pollution

- Plastic in sea affect marine life, where whales, sea turtles, sea birds and fish can't often differentiate between real food and plastic.
- Sea turtles can't differentiate between a jelly fish and plastic so it eat a lot of plastic and get harmed.
- Coral reefs harmed by feeding on plastic due to the effect of UV rays which break down the plastic into micro plastic which look like the food of coral reefs.

Lesson 5 ,6 : impact in a food web
Habitat restoration

The importance of coral in Marine food webs

- Food for a variety of primary consumers.
- Shelter for many organisms in the sea.

If the coral reefs disappeared the marine ecosystem will destroyed.

- many organisms that depend on coral for food and shelter will die
- Because the parrot fish, tiger fish and butter fly fish will not have nothing to eat so they will die.
- The shark will find a small amount of food to eat so it will die.





- The algae that live in coral tissues will lose their habitats.

Habitat Restoration: it is the process of returning a habitat back to its natural state before harm was done.

Habitat Restoration projects try to repair all parts of the habitat.

Most of habitat restoration projects require a lot of work and take a long time.

Rebuilding coral reefs: (a coral reef rehabilitation project

- scientist collect small parts of different coral species and then move them to a nursery.
- **Nursery:** is an area in the sea, where scientists take care of small pieces of coral until they grow up.

Protecting coral reefs from plastic pollution:

In Egypt, coastal communities near the coral reefs applied a new way of life known as a (zero plastic) where people can:

- Replace plastic forks with wooden ones.
- Replace plastic bags with cloth ones.

Theme 2 :Matter and Energy

Lesson 1 : Matter

Matter : It is anything that has a mass and takes up space (has a volume)

The different types of matters :(solid – liquid – gas)

States of water :

solid state	liquid state	Gas state
ice cubes	water flowing out of the tape	steam comes out of the boiling water

Properties of matter

Color	Hardness	Size ,volume	Temperature	Shape
- One color -Many color -Colorless	-Hard like a brick -Soft like a feather.	-Big - Small -Tiny that you can't see	- hot - cold	- round - square

States of matter :

Solid matter	Liquid matter	Gas matter
- Ice- Gold- Wood	- Oil- Water- Milk- Vinegar	- Air, Water vapor(steam) - Carbon dioxide- Oxygen

Lesson 2 : matter particles

Solid	Liquid	Gases
- Have definite (fixed) volume and shape.	- Have definite volume but they don't have definite shape so, they take the shape of their containers.	- Definite no volume and shape, so they take the volume and shape of their containers.

We can measure the length of some matter using ruler or measuring tape.

- We can measure the mass of matter using a scale.
- Matter can change from one state to another such as from solid to liquid by melting, from liquid to solid by freezing.

There are some things that are not matter as light and sound which are forms of energy.

Particles of all matter

Particles of solid matter	Particles of liquid matter	Particles of gas matter
-They are very close to each other (Packed tightly). -They have less energy. -They move only a little bit. They are packed closely together, so: -They vibrate or move around their place. -They cannot move from one place to another and cannot slide over each other.	- They have more spaces. - They have more energy - They can move more freely. They are held more loosely, than particles of solids, so: -They move faster than solid particles. -They can slide over each other so, they take the shape of their containers.	- They have a lot of spaces. - They have a lot of energy - They move very freely They are not held together, so: -They move very quickly in all directions. -they can spread out to fill up any container they put in.

Lesson 3 : states of matter

The shape of solid matter	The shape of liquid matter	The shape of Gas matter
- They have a definite (fixed) shape. - Their shape do not change unless Something is happening to change them.	- They do not have definite shape. - They take the shape of their containers.	- They do not have definite shape. - They completely fill their containers and take their shapes.

Matter is something that you can: Feel ,See ,Smell

Lesson 4 : modeling the particles of matter

- When you heat a solid matter ,the movement of its particles becomes faster.

- a cup of ice in the sunny day









- Using model is away to some scientific concept than can make ideas more clear.
- By heating a liquid matter it changes into gas matter.
- Particles of solid are organized and have a regular pattern.
- Objects that are too small such as germs or too large such as solar
system can be studied easily when using model.
- You can use these balls to describe the movement of particles of the three states
of matter.



- The size of particles depends on :

1- The type of particles.
2- How particles connect each other.

To see the components of one particles such as One blood cell, scientist cannot use the regular microscope , but the use special microscope Called { **Electron microscope**}

How can we show the particles exist ?

We can use gas matter such as air which is made of invisible tiny particles as follow:



When you blow up a balloon	When you squeeze a balloon
- The particles of air inside the balloon move very quickly - The particles of air hit and bounce the balloon from inside, so they produce a force that inflates the balloon and gives it a round shape.	The particles come close together so ,the balloon becomes smaller - If you squeeze more on the balloon, it will pop and the particles of air inside the balloon will escape. 

Lesson 5 : models

Model:

It is a copy that is similar to a real thing.



- Models help us understand things we cannot easily see such as :
- We cannot see the Earth which is too big while we are standing on it. But, we can observe and understand it using the model globe shown the previous picture.
- Models can represent very tiny thing in a bigger size because It is hard to see them

Germs model	Volcano model	Airplane model
- A model of a germ helps us to : - See the shape of a germ without microscope. - See different parts of germs which help them to know how to spread from one person to another.	A model of a volcano shows us : - The shape of a volcano. - How the liquid that comes out of a volcano	A model of airplane : - shows us how it flies up into the air

- **Germs** are very tiny and they are spread around us which make us sick

Modeling States of Matter

Solid model	Liquid model	Gas model
The arrangement of particles in: - Solid matter: They have a regular pattern	The arrangement of particles in: (organized). - Liquid matter: They have a random arrangement (not well organized).	The arrangement of particles in: - Gas matter: They have a random arrangement (not organized at all).

Concept 2.2 lesson 1 : how to describe and measure matter

Describe matter	Measure matter
1-By its color , shape ,texture, size. 2-By its state whatever it is solid , liquid ,gas.	1-Balance to measure it's mass. 2-Ruler to measure the length. 3- Thermometer to measure the temperature.

Kinds of materials which people use to make roof

	Desert home	Cold weather home	Tropical rainforest home
Material of roof	Made of strong stones	made of ceramic tiles (ceramic bricks)	Made of leaves and sticks
Properties of roof material	-It's flat. -It protects the home from dust and dirt.	-It's slanted (inclined). -It protect the home from rains.	-It's slanted. -It protects the home from animals getting inside.

- The type of material used to make a roof depends on the climate where the home is . Everything around us is made of matter.

Measuring matter

volume	Length	mass	temperature
Measuring cup	- Measuring Tape - ruler	balance	thermometer

Measuring matter: each property of material can be measured by using special measuring tool You may need to measure more than one property of material to determine if this material is the right one to use.

Lesson 2 : the case of kitchen mystery



4 different materials like (sugar, salt, flour ,unknown mixture)

- Check their texture with your hands , smell their odor ,and examine them with a lens.(you will find the following observations)



1- All substances have the same color.
2-The substances have different odors.
3-The substances are made up of:
a-Large crystals as in sugar.
b-Small crystals as in salt.
c-Very fine particles as in flour.
d-A mixture of large and very fine particles as in unknown mixture.
The unknown mixture is a mixture of sugar and flour.



- color ,texture ,odor ,shapes are some properties of the matter that are called physical properties.

Physical properties	chemical properties
- Properties of matter which you can observe them by using your five senses. -we can use words such as rough , blue, round and sweet to describe the physical properties	- chemical properties are observes and measured by the changes that happen in the material when it interacts with the other materials like: - The ability to burn: like the paper interact with fire , the paper becomes ash. - The ability to rust : like the iron nail interacts with water and air , the iron rusts.

The volume and mass of matter

Volume	Mass
It's the amount of space the matter takes The measuring units of volume are : -liters(L) -Milliliters(mL) -cubic centimeter(cm3)	It's the measure of the amount of Matter The measuring unit of mass are : -gram(gm) -kilogram(kg)
1L= 1000 ml = 1000 cm3 A big bottle of water contains 1 liters or more.	1kg=1000 gm A paperclip has a mass of 1 gm

- 1 liter of water has a mass of 1 kg.

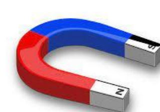
Temperature

is a measure of how quickly the particles move in the matter.

1-Quickly moving particles produce more heat energy than slower moving particles.

2-Volume , mass and temperature are properties of matter that you can measure.

Lesson 3 : measuring properties




Tools

Using a basin filled with water , magnet , balance , stone , iron nail , piece of wood , Piece of cork

Steps

1-Hold the magnet near to each substance and see what substance is attracted to the magnet .

2-Measure the mass of each substance by the balance .

3-Put all substances in the basin of water and see which will float and which will sink.

property	**substance**	**stone**	**Iron nail**	**Piece of wood**	**Piece of cork**
Attracted to magnet or not		No	Yes	No	No
Mass(g)		50	30	100	20
Sink or float		Sinks	Sinks	Floats	floats

Conclusions

1-Some substances are attracted to the magnet and some doesn't.

2-Floating and sinking doesn't depend on the mass of the matter.

3- Changing the shape of the material doesn't affect its mass.

If you cut an apple in two halves and measure the mass of one half , the

mass would be half the mass of the original apple.

Measuring matter

	Material 1	Material 2	Material 3
Mass	129 g	150 g	99 g
Length	37 cm	55 cm	23 cm
Volume	100 ml	115 ml	5 ml

Conclusions

Material (1) Is biggest in mass but not the largest in volume.
Material (2) have the largest volume but not the biggest mass.
Material (3) is the longest one

Lesson 4 : useful properties of matter

Helium

Properties of helium

Physical properties	Chemical properties
It is a light gas which means it is lighter than air.	It is not poisonous. It is not flammable (A flammable material means that this material burns and form fire).

Uses of helium

- Balloons and blimps filled with helium always rise up in the air.
- Because the helium is lighter than air.

Copper

Copper physical properties:

- It can be stretched into thin, flexible wires.
- It Conducts electricity well (good conductor of electricity).
- It conducts heat well (good conductor of heat).

Uses of copper

- It is used in making electrical wires
- It is used in making cooking pans
- Electric wires are made up of copper. Because copper is a good conductor of electricity and can be stretched into a thin, flexible wire.

- Wood and plastic are bad conductors of heat so, they can be used in making handles of cooking pans.



Uses of matter

Types of matter	Uses purpose	Property
Steel	Screwdrivers , Hammers	- Hard - Strong
Glass	Windows , Eyeglasses	- Transparent - Smooth
Rubber	Athletic shoes, Tires , Gloves	- Water proof - Flexible

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Lesson 5 : in action



Architects and builders :

. They carefully measure materials when building homes and schools because they must know correct lengths and widths of boards before building walls.

. Knowing the properties of materials and the correct measurements help architects and builders to build up safe buildings.

Baker

- Bakers must measure the volume and mass of ingredients before start baking.

It too much or too little baking powder is used in baking a cake, the bakers could not make a good cake.

Scientists

Scientists often measure matter during their researches.

The following table shows some measurements that different scientists do:



Paleontologists	Space scientists	Marine biologists
Measure the size and shape of fossils.	Measure the mass of planets and stars.	Measure the speed of Sound produced from animals such as whales and dolphins.

Scientists must use accurate measurements when they do experiments or researches.

Cartographers

- They are responsible for measuring and mapping Earth's surface.
- Maps can give us information about climate and topography (that studies mountains, lands, seas , oceans, ... etc. on the Earth's surface).

The role of cartographers

1) They create city maps to help tourists find their way.
2) They use information and photos from satellites to create maps of The Earth's surface , The moon's craters
3) They create marine charts to guide ships through dangerous water.



Concept 2.3 lesson 1 : states of matter



-Matter can be changed from state to another by cooling or heating but the mass (amount) and number of particles don't change .

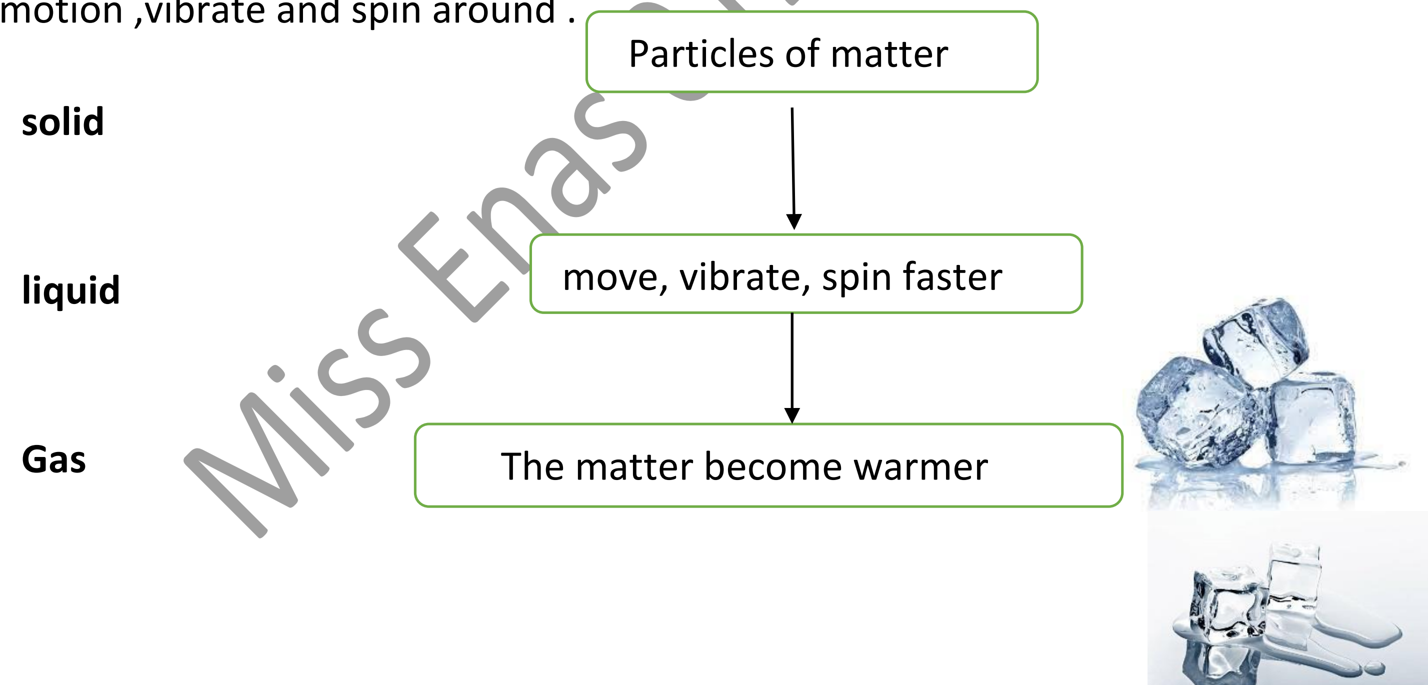
- Water exists in three states: ice (solid state) ,water (liquid state) and water vapor (gas state).

- When you leave piece of chocolate in sun or cube of ice in a hot place they will melt and change from solid state to liquid state.

Melting : Process in which the matter is changed from solid to liquid state when its temperature increases by heating.

- We use Thermal energy (heat energy) in cooking food and warming homes.

- Any matter consists of very small particles, these particles are always in motion ,vibrate and spin around .



Lesson 2 : change states of matter

- When melting chocolate it's taste, color and smell don't change . (example on physical change)

Physical change: it is a change in matter without any change in its structure(make up).

- When the temperature of ice **increases** above 0º C it changes into liquid water.
- 0º C is called freezing point of water.
- º C is the measuring unit of temperature.

Evaporation

Boiling

Heated up (gain, taking heat)(melting)

Solid state → **Liquid state**

Cooled(losing, releasing energy(freezing)

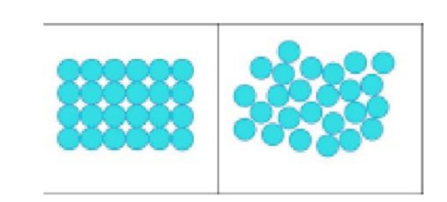
<u>**Lesson 3 : matter changing states**</u>

- Placing a container of ice cubes on hot stove

ice gains thermal energy particles move faster and separate changes into **liquid**

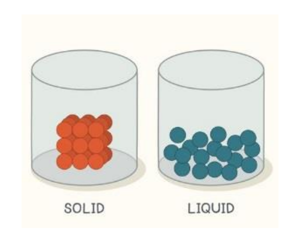
solid → **liquid** **(by heating)**

- Placing **water** in a freezer thermal energy of water transferred to the space in the freezer particles move slower and get close together it changes into **solid** (ice)

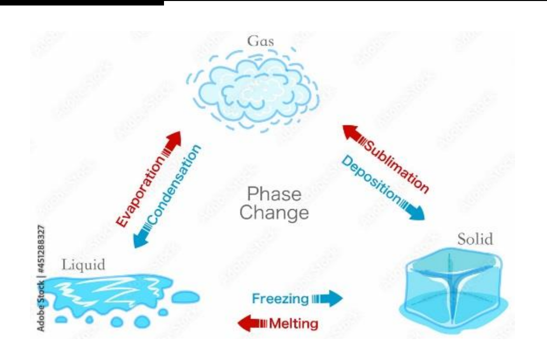


liquid → **solid** **(by cooling)**

- When boiling an amount of water gains thermal energy Particles of water move faster and spread more water changes into water vapor



When water vapor touches a cold lid thermal energy of the water vapor is transferred to the cold lid particles move slower and get close together water vapor changes into water (liquid state)



Difference between mixture and compound

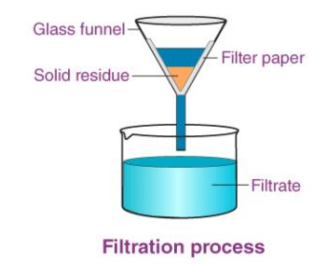
Mixture	Compound
- It is a matter formed of two or more materials . These materials don't combine chemically and mixing them doesn't change them into new substance. As : Salty water, atmosphere ,some types of food salads.	- It is a matter formed of two or more materials . These materials combine chemically to form a new substance. As : Table salt

- Mixtures can be made of:

1- Sand and rocks .

2- Salty water.

3- Air.



Filtration process

- Properties of mixture:

1- It consists of one or more materials ,these materials don't combine chemically.

2- The components can be separated after mixing them.

3- Each material keeps its properties .

4- It consists of one or more materials ,these materials don't combine chemically.

5- The components can be separated after mixing them.

6- Each material keeps its properties .

1- Filtration (if one material in the mixture has smaller particles than the other material)

Ex: separating sand from mixture of sand and water.



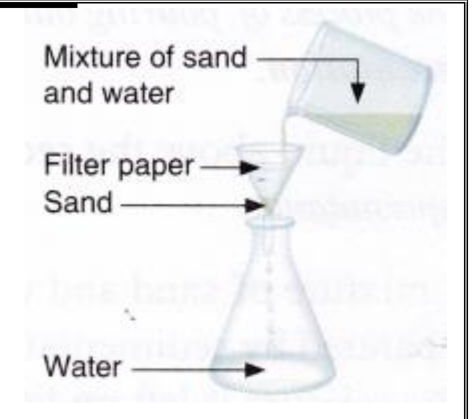
- separating mixtures

2- **Filtration** (if one material in the mixture has smaller particles than the other material)

Ex: separating sand from mixture of sand and water.

3- **Evaporation** (to separate materials that evaporate at different temperature)

Ex: salt from salty water.



Lesson 4 : mixing it up with mass

Experiment 1

1-Weigh 10 gm of salt and 10 gm of pepper with the balance.

2-mix it together, the compare between the sum of their masses before and after mixing.

- The sum of their masses before and after mixing is equal.
- The properties of the substance doesn't change after mixing.

3-weigh 10gm of water and 10 gm of oil with the balance.

4-Mix the water and oil then compare between their masses before and after.

- The sum of their masses before and after mixing is equal .
- The properties of the substances doesn't change .

5- Weigh 10gm of salt and 10 gm of water .

6-Mix them and weigh the masses and compare them before and after mixing.

- The sum of their masses before and after is equal.
- The properties of the substances doesn't change.

So :the masses of substances before and after are equal of these substances after mixing and their properties don't change(forming mixture)

Experiment 2







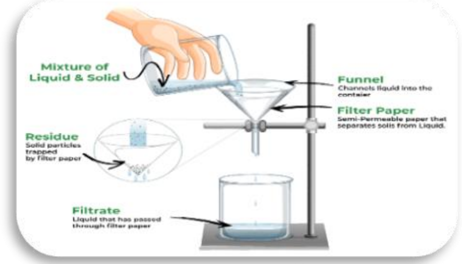


1-weigh 10gm od vinegar and 10gm of baking soda
2-mix them together ,then weigh the mixture before and after mixing
The sum of their masses before and after mixing is equal.
- A gas is formed causing bubbles ,so the properties has changed after mixing.
3-weigh 10gm of cornstarch and 10gm of iodine .
4-mix them together ,then weigh there masses before and after mixing.
The sum of their masses before and after mixing is equal .
- A compound formed and it's color is dark blue ,so the properties has changed after mixing.
So: the masses of substances before and after mixing is equal but the properties has changed (when forming compound).

Lesson 5 :properties of mixtures

The mixture of the salty water consists of water and salt which don't react together.
They can separated by filtration process and evaporation process .
Mixture are made of two or more substances that are physically combined together that means they do not react together.

1- **Sand and water.**
they separated by using filtration process.



2- **Oil and water.**
They consists of two liquid materials mixed together.



3- **salt and pepper.**
They consists of two solid materials mixed together.

4- Air is a mixture of some gases.

Physical Changes In Our Lives

- **Physical change** is a change in the shape of matter without any change in its structure.
- Physical changes don't form (new substances) but they can change size, shape or state of matter.(melting) but rust not physical change

Physical change	chemical change
1. Cutting paper 2. Making salad 3. Melting wax	1. Burning a paper forming ash. 2. Making bread. 3. Iron rust when metals react with oxygen and water. 4. Mixing vinegar with baking soda

Chemical changes : It is a change in the structure of matter producing a new matter.

Lesson 6 : changes of matter

Physical changes	Chemical changes
-Change in size: -Cutting a paper Cutting fruit. **-Change in shape:** -Coiling a straight piece of wire to form a spring. -The flow of sand in an hourglass changes the shape of sand in the container.	**-Unexpected color change** -When mixing iodine with cornstarch, a new substance is formed and its color is dark blue. -**Formation of gas bubbles.** -When mixing baking soda with vinegar, gas bubbles appear. -**Formation of bad odor** -Living a cup of milk out of the fridge

Expected change in color

-Adding drops of food

- coloring a paper

Change state of matter

-Melting a butter or
ice.

-Evaporation of water.

- Boiling of water

-Condensation of water.



for about two days can produce a bad smell (due to the chemical change happens to milk

- Making yoghurt from milk.
- Iron rust, when combines with oxygen and water.

*Rust is a chemical substance called iron oxide which is a layer with reddish color.

-When oxygen combines with carbon and hydrogen,
they release heat that can start fire.

*The fire can change substances as wood into ash.

-When vinegar combines with baking soda,
they form gas bubbles.





Lesson 7 : water

-Fresh water is about 70% of the surface of the earth which is covered by oceans.

-The water of the seas and oceans is a mixture of water, salt , other minerals, gases, living organisms and dead organisms.

Mixture : is a matter formed of two or more materials that don't combine chemically.

Desalination:

It is the process of removing salt from water.



-The components of mixtures can be separated by the following processes:

1-Filtration:

- It removes any large materials such as seaweed, shells and fish.

Water, salts, minerals and gases would pass through filters that makes water still undrinkable.



2- Evaporation:

- When boiling the filtered water, water vapor rises up leaving salts and other minerals.

When cooling the water vapor, it is turned into liquid water and it is safe to drink it.

- Filtration and evaporation are used to

Separate fresh drinkable water from the water of seas and oceans

Problems of desalination (disadvantages).

- It needs a big amount of energy.
- It is very expensive process.
- Small marine organisms can be hurt, due to sucking of water into the desalination plants.
- It may cause many environmental problems.

drinking salt water makes human body dehydrate faster which means that the human body loses water faster.